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phytic characters of the ferns can be estimated, the criterion of position of the nascent sorus may be held to take precedence, in point of early origin and constancy, over any soral characters except the primal features of the sporangium itself, and over any anatomical characters of the axis derivative from the protostele." This is certainly an important conclusion, and in accordance with it, the leptosporangiatae ferns (exclusive of the Osmundaceae) are grouped into two series: the "Superficiales," in which the origin of the sorus is constantly from the leaf-surface; and the "Marginales," in which it is as constantly from the margin.—J. M. C.

**Morphology of Riccia.**—Miss BLACK<sup>40</sup> in a recent study of *Riccia Frostii* Aust. finds that this species is strictly dioicous and that the sex organs are scattered irregularly in acropetal succession. From the standpoint of the arrangement of sex organs, this indicates that *R. Frostii* is more primitive than *R. natans*, in which the antheridia are clustered in a disk, and the archegonia, which appear later, are usually in two rows. From the standpoint of restriction of antheridia and archegonia to different individuals, an advance beyond *R. natans* is clearly indicated.

Miss BLACK agrees with Miss HIRSH,<sup>41</sup> who also studied *R. Frostii*, that the air chambers are not produced by splitting of cell walls at the angles of the cells, but by papillate outgrowth. Unfortunately, the figure given, as was the case in the work of Miss HIRSH, does not show the earliest stage in the development of the chamber, but can as easily be cited as proof that air chambers arise by splitting at the angles of the cells of the dorsal layer. The youngest air chamber shown is too old to settle the question either way, but a study of the relation of cells in the figure indicates that possibly the chamber may have arisen by splitting of the dorsal layer. This splitting need not originally occur within the tissues as some recent writers assume, but may, as DEUTSCH showed in *Targionia*, extend from the surface inward.

The rest of the investigation, which includes the development of sex organs, spermatogenesis, and sporogenesis, gives us nothing new.—W. J. G. LAND.

**Peripheral leaf cells.**—In many leafy liverworts there is a marked difference in form and markings of the peripheral cells of the leaf as compared with those farther away from the edge. GARJEANNE,<sup>42</sup> as the result of a study of 10 genera, finds that the thickening of the peripheral cells is stronger if the plant is exposed to conditions which give great variation of water content;

<sup>40</sup> BLACK, CAROLINE A., The morphology of *Riccia Frostii* Aust. Ann. Botany **27**:511-532. pls. 37, 38. 1913.

<sup>41</sup> HIRSH, PAULINE E., The development of the air chambers of Ricciaceae. Bull. Torr. Bot. Club **27**:73-77. figs. 6. 1910.

<sup>42</sup> GARJEANNE, A. J. M., Die Randzellen einiger Jungermannienblätter. Flora **105**:370-384. 1913.

that the peripheral cells, irrespective of their form and thickenings, show a smaller number of plastids and oil bodies than the other cells of the leaf; that they are frequently distinguished from the flat cells by a greater capacity for taking up aqueous methylene blue and other basic anilin dyes, as well as by a greater blackening with silver nitrate; that the cells which color most strongly are in general those from which regeneration shoots develop and that the greater capacity for taking up color is not due to tannin. He concludes that the peripheral cells contain materials which are of significance for the production of adventitious shoots; that transportation of this material is very possible and consequently any cell of the leaf may thereby become capable of regeneration.—W. J. G. LAND.

**The androecium of Parnassia.**—Mrs. ARBER<sup>43</sup> has made an anatomical investigation of the stamens of *Parnassia*, and has applied the results to the problem of the affinities of the genus. The vascular strands for the stamens arise at a lower level than those for the staminodia, and the two sets are independent. This seems to confirm the view that the staminodia represent an inner set of stamens. In *P. palustris* the vascular strand traversing the filament is mesarch, "and there are indications of numerous phloem groups arranged round the xylem." This is thought to mean the presence of vestigial vascular strands which indicate that each stamen of *Parnassia* is reduced from an ancestral fascicle of stamens, such as occurs in *Hypericum*. DRUDE's view that *Parnassia* deserves to represent a family of its own, related to Saxifragaceae, Droseraceae, and Hypericaceae, is confirmed, and the view is expressed that the affinity between *Parnassia* and the Saxifragaceae "has been somewhat overestimated."—J. M. C.

**The life history of Thelygonum.**—In a study of *Thelygonum* from the germination of the seed to the mature embryo, SCHNEIDER<sup>44</sup> deals with gross morphological features, the development of both staminate and ovulate flowers, the reduction divisions, the development of the gametophytes, fertilization, and the development of the embryo and seed coats. In the cytological portions of the paper, it is seen that the root tips have 20 chromosomes arranged in definite pairs, the reduced number is 10, and fertilization is of the usual double character. In conclusion, the author agrees with HALLIER in placing the Thelygonaceae near the Haloragidaceae. While there is still room for complete life history studies of new or unusual plants, in most cases the time has come for intensive work on special features. In this case it looks as if it might have been worth while to look for a differentiation among chromosomes.—C. J. CHAMBERLAIN.

<sup>43</sup> ARBER, AGNES, On the structure of the androecium in *Parnassia* and its bearing on the affinities of the genus. *Ann. Botany* 27:491-510. *pl. 34.* 1913.

<sup>44</sup> SCHNEIDER, HANS, Morphologische und entwickelungsgeschichtliche Untersuchungen an *Thelygonum Cynocrambe* L. *Flora* 106:1-41. *figs. 23.* 1913.